CLAIMS

1. An anode material having a reaction phase containing:

an element capable of generating an intermetallic compound with lithium (Li); and

carbon (C), wherein

a peak of carbon is obtained in a region lower than 284.5 eV by X-ray photoelectron spectroscopy.

2. An anode material according to claim 1, wherein a half value width of a diffraction peak obtained by X-ray diffraction of the reaction phase is 0.5° or more.

3. An anode material according to claim 1, wherein the reaction phase contains tin (Sn) and at least one from the group consisting of nickel (Ni), copper (Cu), iron (Fe), cobalt (Co), manganese (Mn), zinc (Zn), indium (In), and silver (Ag).

4. An anode material according to claim 3, wherein the reaction phase contains tin; at least one from the group consisting of zinc, indium, and silver; and at least one from the group consisting of nickel, copper, iron, cobalt, and manganese.

5. An anode material according to claim 1, wherein the reaction phase further contains at least one from the group consisting of elements from Group 4 to Group 6 in the long period periodic table.

6. An anode material according to claim 1, wherein a ratio of carbon is from 2% by weight to 50% by weight.

7. An anode material according to claim 1, wherein a specific surface area is from 0.05 m^2/g to 70 m^2/g.

8. An anode material according to claim 1, wherein a median size is 50 μm or less.

9. An anode material according to claim 1, wherein an average crystal particle diameter of the reaction phase is 10μm or less.

10. An anode material having a reaction phase containing:

tin (Sn); and

carbon (C), wherein

an energy difference between a peak of $3d_{5/2}$ orbit of tin atom ($Sn3d_{5/2}$) and a peak of 1s orbit of carbon atom (C1s) obtained by X-ray photoelectron spectroscopy is larger than 200.1 eV.

11. An anode material according to claim 10, wherein a half value width of a diffraction peak obtained by X-ray diffraction of the reaction phase is 0.5° or more.

12. An anode material according to claim 10, wherein the reaction phase

further contains at least one from the group consisting of nickel (Ni), copper (Cu), iron (Fe), cobalt (Co), manganese (Mn), zinc (Zn), indium (In) and silver (Ag).

13. An anode material according to claim 12, wherein the reaction phase contains at least one from the group consisting of zinc, indium, and silver; and at least one from the group consisting of nickel, copper, iron, cobalt, and manganese.

14. An anode material according to claim 10, wherein the reaction phase further contains at least one from the group consisting of elements from Group 4 to Group 6 in the long period periodic table.

15. An anode material according to claim 10, wherein a ratio of carbon is from 2% by weight to 50% by weight.

16. An anode material according to claim 10, wherein a specific surface area is from 0.05 m^2/g to 70 m^2/g.

17. An anode material according to claim 10, wherein a median size is 50 μm or less.

18. An anode material according to claim 10, wherein an average crystal particle diameter of the reaction phase is 10μm or less.

19. A method of manufacturing an anode material having a reaction phase containing an element capable of generating an intermetallic compound with lithium (Li) and carbon (C), including a step of synthesizing the anode material by mechanical alloying method by using a raw material containing an element capable of generating an intermetallic compound with lithium and a raw material for carbon.

20. A method of manufacturing an anode material according to claim 19, wherein as a raw material containing an element capable of generating an intermetallic compound with lithium, an alloy containing at least two or more elements other than carbon is used.

21. A method of manufacturing an anode material according to claim 19, wherein as a raw material for carbon, at least one from the group consisting of non-graphitizable carbon, graphitizable carbon, graphite, pyrolytic carbons, coke, glassy carbons, organic high molecular weight compound fired body, activated carbon, and carbon black is used.

22. A method of manufacturing an anode material according to claim 19, wherein as a raw material for carbon, at least one from the group consisting of fiber type, spherical type, granular type, and scale type carbonaceous materials is used.

23. A battery comprising:

a cathode;

an anode; and

an electrolyte, wherein

the anode contains an anode material having a reaction phase containing an element capable of generating an intermetallic compound with lithium (Li) and carbon (C), and wherein

the anode material provides a peak of carbon in a region lower than 284.5 eV by X-ray photoelectron spectroscopy.

24. A battery according to claim 23, wherein a half value width of a diffraction peak obtained by X-ray diffraction of the reaction phase is 0.5° or more.

25. A battery according to claim 23, wherein the reaction phase contains tin (Sn) and at least one from the group consisting of nickel (Ni), copper (Cu), iron (Fe), cobalt (Co), manganese (Mn), zinc (Zn), indium (In) and silver (Ag).

26. A battery according to claim 25, wherein the reaction phase contains tin; at least one from the group consisting of zinc, indium, and silver; and at least one from the group consisting of nickel, copper, iron, cobalt, and manganese.

27. A battery according to claim 23, wherein the reaction phase further contains at least one from the group consisting of elements from Group 4 to Group 6 in the long period periodic table.

28. A battery according to claim 23, wherein in the anode material, a ratio of carbon is from 2% by weight to 50% by weight.

29. A battery according to claim 23, wherein a specific surface area of the anode material is from 0.05 m^2/g to 70 m^2/g.

30. A battery according to claim 23, wherein a median size of the anode material is 50 μm or less.

31. A battery according to claim 23, wherein an average crystal particle diameter of the reaction phase is 10 μm or less.

32. A battery comprising:

a cathode;

an anode; and

an electrolyte, wherein

the anode contains an anode material having a reaction phase containing tin (Sn) and carbon (C), and wherein

in the anode material, an energy difference between a peak of $3d_{5/2}$ orbit of tin atom ($Sn3d_{5/2}$) and a peak of 1s orbit of carbon atom (C1s), which are obtained by X-ray photoelectron spectroscopy is larger than 200.1 eV.

33. A battery according to claim 32, wherein a half value width of a diffraction peak obtained by X-ray diffraction of the reaction phase is 0.5° or more.

34. A battery according to claim 32, wherein the reaction phase further contains at least one from the group consisting of nickel (Ni), copper (Cu), iron (Fe), cobalt (Co), manganese (Mn), zinc (Zn), indium (In) and silver (Ag).

35. A battery according to claim 34, wherein the reaction phase contains at least one from the group consisting of zinc, indium, and silver; and at least one from the group consisting of nickel, copper, iron, cobalt, and manganese.

36. A battery according to claim 32, wherein the reaction phase further contains at least one from the group consisting of elements from Group 4 to Group 6 in the long period periodic table.

37. A battery according to claim 32, wherein in the anode material, a ratio of carbon is from 2% by weight to 50% by weight.

38. A battery according to claim 32, wherein a specific surface area of the anode material is from 0.05 m^2/g to 70 m^2/g.

39. A battery according to claim 32, wherein a median size of the anode material is 50 μm or less.

40. A battery according to claim 32, wherein an average crystal particle diameter of the reaction phase is 10 μm or less.